

### **REMARKS/ARGUMENTS**

The undersigned attorney wishes to thank Examiner Chapman for the courtesy of a very helpful telephone interview on February 7, 2007 to discuss the November 24, 2006 Final Office Action and, in particular, the patentability of the pending claims under 35 U.S.C. § 103(a) over U.S. Patent No. 5,588,977 to Pavlov et al. ("the Pavlov '977 Patent") and U.S. Patent No. 5,821,184 to Haines et al. ("the Haines '184 Patent"). While no definitive agreement was reached between the Examiner and the undersigned attorney during the telephone interview, it ended productively with the undersigned attorney's proposal to file a Request for Continued Examination to pursue Claims 63-115 in this application and a continuation application to pursue Claims 1-62 separately. It is our understanding that the proposal was agreeable to the Examiner. Hence, Claims 1-62 have been canceled without prejudice by this Amendment and a Request for Continued Examination for remaining Claims 63-115 is being submitted herewith. Applicants intend to file a continuation of this application to pursue the claims comparable in scope to canceled Claims 1-62 in due course.

Upon entry of this Amendment, Claims 63-115 will be pending in the present application for consideration. Other than canceled Claims 1-62, no amendment has been made to any of the remaining pending claims in response to the November 24, 2006 Office Action.

In connection with submission of this Amendment, one of the inventors of the present application, Dr. Pedro M. Buarque de Macedo, respectfully submits herewith his Declaration pursuant to 37 C.F.R. § 1.132 ("the Macedo Declaration"). The Macedo

Declaration is based on Dr. Macedo's review and understanding of the November 24, 2006 Office Action and the prior art references relied upon by the Examiner therein as well as his general knowledge as one of ordinary skill in the relevant art.

It is respectfully submitted that no new matter has been introduced by this Amendment. Favorable consideration and prompt allowance of all of the pending claims in view of the following remarks and the Macedo Declaration are respectfully requested.

Applicants respectfully respond to the November 24, 2006 Office Action as follows:

**Claim Rejections - 35 U.S.C. § 103:**

In the November 24, 2006 Office Action, the Examiner rejected Claims 1-27, 31-59, 63-85 and 90-112 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,588,977 to Pavlov et al. ("the Pavlov '977 Patent") in view of U.S. Patent No. 5,821,184 to Haines et al. ("the Haines '184 Patent"). See November 24, 2006 Office Action at 2. In addition, the Examiner rejected Claims 29-30, 60-62, 86-89 and 113-115 under 35 U.S.C. § 103(a) as being unpatentable over the Pavlov '977 and Haines '184 Patents as applied to Claim 1, and further in view of U.S. Patent No. 5,069,960 to Fukumoto et al. ("the Fukumoto '960 Patent"). See November 24, 2006 Office Action at 3. Applicants respectfully traverse these prior art rejections for the following reasons.

First, since Claims 1-62 have been canceled without prejudice by this Amendment, the Examiner's rejection of these claims is rendered moot. The patentability of these claims over the Pavlov '977, Haines '184 and Fukumoto '960 Patents will be addressed by Applicants, if still necessary, during prosecution of the continuation of this

application, which Applicants intend to file in due course to pursue the claims comparable in scope to the foregoing canceled claims.

As for the remaining claims, independent Claim 63 requires a foam glass tile having, *inter alia*, a compression strength of 12,500 pounds per square inch (psi), and independent Claim 90 requires a foam glass tile having, *inter alia*, a compression strength of 10,000 psi or greater. The Examiner takes the position that these claims are unpatentable over the Pavlov '977 Patent in view of the Haines '184 Patent. Applicants respectfully disagree.

In support of the rejection, the Examiner does not point to any portion of either the Pavlov '977 Patent or the Haines '184 Patent that teaches or even suggests a foam glass tile having a compression strength of 10,000 psi or greater, as required by independent Claim 90, let alone the claimed range of 12,500 psi or greater required by independent Claim 63. Rather, the Examiner merely provides the following supporting statements:

It is clear that if the block or tile is subject to major compressive forces, you would desire a tile with a maximum compression strength. . . . [T]he compression strength over 10,000 lb/ft<sup>2</sup> are viewed as choices obvious to obtain thru option method of making subject to the discretion of use of the article. One of ordinary skill in the art would have appreciated modifying Haines in view of Pavlov or Pavlov in view of Haines to arrive at the foam glass tile with the desired properties and characteristics while using the method to achieve the desired properties and characteristics.

Nov. 24, 2006 Office Action at 3. However, it is respectfully submitted that these statements alone, without any evidentiary support, do not establish a *prima facie* case of

obviousness of independent Claims 63 and 90 over the prior art relied upon by the Examiner.

To establish a *prima facie* case of obviousness of a claimed invention under 35 U.S.C. § 103, all of the claim limitations must be taught or suggested by the prior art. See *CFMT, Inc. v. YieldUp Int'l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003); *In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974); see also MPEP § 2143.03. Furthermore, the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish *prima facie* obviousness. See MPEP § 2143.01. In addition, it is never appropriate to rely solely on common knowledge in the art without evidentiary support in the record as the principal evidence upon which a rejection was based. See MPEP § 2144.03. Under these criteria, the Examiner has failed to establish a *prima facie* case of obviousness of independent Claims 63 and 90 over the prior art.

None of the prior art relied upon by the Examiner discloses or suggests all the limitations of independent Claims 63 and 90. In fact, nowhere in the Pavlov '977 Patent is there any teaching or even suggestion of a foam glass tile having, *inter alia*, a compression strength of 10,000 psi or greater, as required by Claim 90, let alone the claimed range of 12,500 psi or greater for Claim 63. At best, the Pavlov '977 Patent discloses in one of the examples a foam glass product having a compression strength of 8,700 psi (which is converted from 60MPa in Example 22), which falls short of the claimed range of 10,000 psi or greater for Claim 63, let alone the claimed range of 12,500 psi or greater required by Claim 90. See Pavlov '977 Patent, Example 22, Col. 11, lines 45-55. The Pavlov '977 Patent discloses no other examples of foam glass products

having a compression strength greater than 8,700 psi. *See also* Macedo Declaration, par. 5.

Furthermore, the Pavlov '977 Patent discloses that the pore sizes of its foam glass material can range to "several millimeters." Pavlov '977 Patent, Col. 6, lines 13-14. According to the Macedo Declaration, in the course of making strong foam glass tiles as disclosed and claimed in the present application, Dr. Macedo has found that the size of the largest pore or bubble within a foam glass material can be one of the necessary factors in determining its compression strength. In general, he has found the presence of large bubbles weaken the foam glass material and indicate a low compression strength. *See* Macedo Declaration, par. 6; *see also id.*, par. 7 (finding that the claimed density and average pore size are necessary but not sufficient condition for the claimed compression strength in a strong foam glass tile as per the present invention).

By way of comparison, FIGS. 1-3 of the Macedo Declaration show cross sectional views of the foam glass tile samples made in accordance with the present invention, which are respectively described as Examples 7-9 in TABLE 3 in the present application. After the foam glass tile samples were made, they were cut to take the measurements of various properties, exposing the cross sectional views shown in FIGS. 1-3. As shown in FIG. 1 and TABLE 3, the average pore size of Example 7 is 0.8 mm, with none of the largest pores over 1.0 mm. Example 7 achieves a compression strength of 10,500 psi. Similarly, Example 8 shown in FIG. 2 has an average pore size of 0.6 mm, with, again, none of the largest pores over 1.0 mm, and achieves a compression strength of 12,500 psi. Example 9 shown in FIG. 3 has an average pore size of 0.3 mm, with none of the

largest pores over 1.0 mm, and achieves a compression strength of 14,600 psi. *See* Macedo Declaration, par. 8.

In view of the foregoing, Dr. Macedo concludes that a foam glass material having largest pores reaching several millimeters in size would unlikely achieve the claimed range of 10,000 psi or greater in compression strength as required by Claim 90, let alone the claimed range of 12,500 psi or greater required by Claim 63, confirming that the Pavlov '977 Patent does not disclose the claimed ranges of compression strength. *See id.*, par. 9.

In addition, independent Claim 63 requires the claimed foam glass tile to have an average pore size of 0.5 mm or less, while independent Claim 90 requires an average pore size of 1.0 mm or less. Rather than providing any average pore size measurement data for its 43 examples, however, the Pavlov '977 Patent merely mentions that "[t]he pore sizes can range from a few microns to several millimeters." Pavlov '977 Patent, Col. 6, lines 13-14. In fact, the Pavlov '977 Patent suggests a "maximum porosity" for the purpose of heat-insulating and heat conducting property. *See id.*, Col. 2, lines 49-51 and Col. 6, lines 15-16. Thus, not only does the Pavlov '977 Patent fail to disclose the claimed ranges of compression strength required by Claims 63 and 90, it also fails to disclose the claimed ranges of average pore size that are necessary for achieving the high compression strength required by those claims.

Neither does the Haines '184 Patent disclose or suggest a foam glass tile having, *inter alia*, a compression strength within the claimed range of 10,000 psi or greater as required by Claim 90, let alone the claimed range of 12,500 psi or greater for Claim 63.

In fact, the Haines '184 Patent provides no compression strength data for the 18 examples of foam glass articles it describes. *See also* Macedo Declaration, par. 10.

In addition to the claimed ranges of compression strength, independent Claim 63 requires a foam glass tile to have, *inter alia*, a density of 30 pcf or greater, while independent Claim 90 requires a foam glass tile to have, *inter alia*, a density of 50 pcf or greater. Of the 18 examples of foam glass articles disclosed by the Haines '184 Patent, none has a density within the claimed range of 50 pcf or greater as required by independent Claim 90. *See* Macedo Declaration, TABLE, par. 11. Furthermore, Example 17 of the Haines '184 Patent is the only example having a density, 42.6 pcf, within the claimed range of 30 pcf or greater as required by independent Claim 63. *See* Haines '184 Patent, Example 17, Col. 9, line 62. However, no compression strength data is provided for Example 17 by the Haines '184 Patent. In fact, as explained below, the compression strength of this particular example from the Haines '184 Patent does not come anywhere near the claimed range of 10,000 psi or greater as required by Claim 90, let alone the claimed range of 12,500 psi or greater required by Claim 63.

One of the Applicants, Dr. Pedro M. Buarque de Macedo, directed and supervised the experiments in his university laboratory to replicate the foam glass article described in Example 17 of the Haines '184 Patent. *See* Macedo Declaration, par. 12. His signed Declaration Under 37 C.F.R. § 1.132, which is respectfully submitted herewith, describes the results of the experiment and on the basis of the results, concludes that that the foam glass article produced in accordance with the steps and recipes set forth in Example 17 of the Haines '184 Patent cannot possibly achieve a compression strength within the

claimed ranges of 10,000 psi and greater as required by Claim 90, let alone the claimed range of 12,500 psi and greater as required by Claim 63. *See* Macedo Declaration, pars. 13-17.

In particular, FIGS. 4-8 in the Macedo Declaration show a foam glass article produced in accordance with the teachings set forth in Example 17 of the Haines '184 Patent that are viewed from various angles. The figures clearly show that the foam glass article developed large cracks and severe fractures running across the surfaces and through the body. *See id.*, par. 14. Dr. Macedo also observed that the pores or bubbles in the foam glass article are mostly interconnected, with the resulting interconnected bubbles reaching several millimeters in length. *See id.*, par. 15. This observation is in agreement with the disclosure of the Haines '184 Patent that "the cell structure of the inventive foam glass is open, interconnected, and irregular." Haines '184 Patent, Col. 4, lines 61-62.

Based on these observations, Dr. Macedo found that this foam glass article produced in accordance with the teaching of the Haines '184 Patent that has large cracks and fractures, as well as long interconnected bubbles, running across the surface and through the body does not meet the necessary condition to possess a high enough compression strength suitable for the intended purpose and use contemplated by the present invention, which include use for protective building surfaces and shock absorption. *See* Macedo Declaration, par. 16. While no compression strength measurement could be obtained because the foam glass article was too badly cracked, Dr. Macedo concluded that it simply does not meet the necessary condition to possess a



high compression strength even at the level of even 4,000 psi, which is a typical compression strength of a concrete, let alone the claimed ranges of 10,000 psi and greater for a strong foam glass tile as required by Claim 90, or 12,500 psi and greater as required by Claim 63. *See* Macedo Declaration, par. 17.

By way of comparison, as described above, FIGS. 1-3 of the Macedo Declaration show the cross sections of foam glass tile samples that are made in accordance with the present invention, having the respective average pore sizes, densities and compression strengths (as described respectively for Examples 7-9 in TABLE 3 of the present application) within the claimed ranges set forth in the pending claims. No cracks or interconnected pores appear in the cross sections of these foam glass tiles. The difference between the claimed invention and the foam glass article produced in accordance with the teachings of the Haines '184 Patent could not be more apparent. *See* Macedo Declaration, par. 18.

In sum, based on the foregoing reasons with the support of the Macedo Declaration, the Haines '184 Patent, either alone or in combination with the '977 Pavlov Patent, does not lead to the foam glass tile having, *inter alia*, a compression strength of 10,000 psi or greater as required by independent Claim 90, or 12,500 psi or greater as required by independent Claim 63. Neither does the Fukumoto '960 Patent teach or suggest a foam glass tile having, *inter alia*, a compression strength within the claimed ranges of Claims 63 and 90. Since none of the prior art relied upon by the Examiner discloses or suggests a foam glass tile having, *inter alia*, a compression strength within the claimed ranges required by independent Claims 63 and 90, the Examiner has not

established a *prima facie* case of obviousness of these claims over the prior art under 35 U.S.C. § 103(a). See MPEP § 2143.03. Furthermore, if an independent claim is non-obvious under 35 U.S.C. § 103, then any claim dependent therefrom is likewise non-obvious. See *In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988). Therefore, the Examiner has not established a *prima facie* case of obviousness of all the claims directly or indirectly dependent on either Claim 63 or Claim 90, i.e., Claims 64-89 and 91-115, either.

In addition, to establish a *prima facie* case of obviousness, there must also be a suggestion or motivation to combine the prior art. See *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998); see also MPEP § 2143.01. However, when none of the prior art relied upon by the Examiner discloses a foam glass tile having a compression strength within the claimed ranges required by the rejected claims as explained above, no one skilled in the art would reasonably be expected to draw from the prior art combination an inference that the claimed ranges of compression strength as set forth in the rejected claims would be desirable.

Furthermore, the prior art references themselves do not provide any suggestion or motivation for combining their teachings. In fact, they suggest quite the opposite. The foam glass articles disclosed by the Haines '184 Patent are directed to surface preparation including "sanding, rubbing and scraping a surface to clean, abrade, polish, etc. such a surface," i.e., a wearable material. Haines '184 Patent, Col. 1, lines 9-17; see also *id.*, Abstract and Col. 1, lines 61-64. For this purpose, the Haines '184 Patent teaches, a foam glass material containing a sulfur-containing compound is unsuitable

and therefore undesirable. *See id.*, Col. 2, lines 38-67. However, the object of the Pavlov '977 Patent is to obtain "glass ceramic wear-resistant materials," which is the opposite of the wearable foam glass article of the Haines '184 Patent. Pavlov '977 Patent, Col. 3, lines 4-5 (emphasis added). In addition, contrary to the suggestion by the Haines '184 Patent against using a sulfur-containing compound, all of the examples of foam glass materials described by the Pavlov '977 Patent contain in their compositions a sulfur-containing compound, SO<sub>3</sub>. *See, e.g., id.*, Col. 6, line 49; Examples 1, 4, 7, 10; and claim 11. In view of these opposing objectives and instructions, one of ordinary skill in the art looking at the Haines '184 Patent and the Pavlov '977 Patent would not be motivated to combine their teachings, but would rather be taught away from doing so. Lacking a motivation to combine the prior art, the Examiner has not shown a *prima facie* case of obviousness of the pending claims over the prior art. *See In re Rouffet*, 149 F.3d at 1358.

Furthermore, to establish a *prima facie* case of obviousness of a claimed invention under 35 U.S.C. § 103, there must also be a reasonable expectation of success. *See In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991); *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1207-08 (Fed. Cir. 1991); *In re Rinehart*, 531 F.2d 1048, 1053-54 (C.C.P.A. 1976); *see also* MPEP § 2143.02. However, one of ordinary skill in the art would not have a reasonable expectation of success in achieving the claimed invention as set forth in the rejected claims by combining the prior art references relied upon by the Examiner, since, as explained above, none of the prior art teaches or even suggests a foam glass tile having a compression strength within the claimed ranges required by the rejected claims, let alone having an average pore size and a density within the respective claimed ranges

at the same time. Furthermore, as explained above, the Haines '184 Patent and the Pavlov '977 Patent, the key prior art relied upon by the Examiner, have mutually opposing objectives and instructions, and therefore do not suggest or motivate the combination of their teachings. Hence, one of ordinary skill in the art would not be reasonably expected to succeed in making the subject matter of the rejected claims merely on the basis of the combination of these references. This is yet another reason why the Examiner fails to establish a *prima facie* case of obviousness of the pending claims over the prior art.

Finally, Claims 90-115 require, *inter alia*, that the claimed foam glass tile comprise a closed pore outer skin on at least one side. The Examiner takes the position that the Haines '184 Patent discloses a closed pore skin. Nov. 24, 2006 Office Action at 2. Applicants respectfully disagree and submit that none of the prior art relied upon by the Examiner, including the Haines '184 Patent, discloses a foam glass tile having a closed pore outer skin on at least one side.

As noted above, the Haines '184 Patent is directed to an article for preparing surfaces by, for example, sanding, rubbing and scraping. Naturally, this function requires that the working surface of the article be abrasive. In fact, the '184 Patent teaches that the outer layer of crust or glassy skin be removed from the foam glass product to expose an abrasive surface. *See, e.g.*, '184 Patent, Col. 3, lines 34-37; Col. 6, lines 28-31; Col. 10, lines 44-46. In other words, the '184 Patent teaches away from forming a closed pore outer skin of a foam glass product.

As also noted by the Examiner, the Haines '184 Patent suggests coating of an adhesive compound on a side of a foam glass product in the context of production of a random orbital sander disk. See Haines '184 Patent, Example 11, Col. 8, lines 45-50. The Haines '184 Patent further teaches that a hook-and-loop fabric system be applied to the adhesive compound so that the resulting foam glass product can be mounted onto an orbital sanding power tool. See *id.* However, such teaching of applying an adhesive coating on a side of a foam glass product so that it can be mounted to a sanding power tool as set forth in the Haines '184 Patent is not pertinent at all to the claimed foam glass tile having a closed pore outer skin on at least one side for the purpose of forming an interior or exterior façade of a building.

Nowhere in the Haines '184 Patent is there any teaching or suggestion of forming a foam glass tile comprising a closed pore outer skin on at least one side. Rather, as noted above, the Haines '184 Patent teaches away from the forming of a closed pore outer skin on at least one side of a foam glass product. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. MPEP 2141.02.VI. And it is improper to combine references where the references teach away from their combination. MPEP 2145.X.D.2.

Accordingly, contrary to the Examiner's position, the Haines '184 Patent does not render obvious the claimed foam glass tile comprising, *inter alia*, a closed pore outer skin on at least one side, either by itself or in any combination. It is respectfully submitted that based on the foregoing reason alone, the Examiner has not established a *prima facie* case of obviousness of Claims 90-115 over the prior art.

Based on the foregoing reasons, Applicants respectfully request that the Examiner's rejection of Claims 63-85 and 90-112 over the Haines '184 Patent and the Pavlov '977 Patent, and the Examiner's rejection of Claims 86-89 and 113-115 over the Haines '184 Patent, the Pavlov '977 Patent, and the Fukumoto '960 Patent be withdrawn, and that all of the pending claims be allowed over the cited prior art. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) ("If examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent.").

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In view of the foregoing remarks, Applicants respectfully request that a timely Notice of Allowance with respect to all of the pending claims be issued in this case.

Included herewith are (1) a Communication, (2) a Request for Continued Examination, (3) a Declaration Under 37 C.F.R. § 1.132 signed by one of the co-inventors, (4) a Petition for a One Month Extension of Time, and (5) a check in the amount of \$455.00 to cover the fee (\$395.00) for filing the Request for Continued Examination and the fee (\$60.00) for the one-month extension of time for response for a small entity. No additional fees or extensions of time are believed to be due in connection with filing of this Amendment After Final and the Request for Continued Examination. However, authorization is given hereby to charge Deposit Account No. 01-1785 for any deficiency in fees necessary to preserve the pendency of the subject application, or to credit the same in case of overpayment.

Should the Examiner believe that a telephone discussion would be helpful to expedite prosecution, she is invited to call the undersigned attorney at any convenient time.

Respectfully submitted,

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